HEADQUARTERS

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

PETERSON AIR FORCE BASE, COLORADO 80914-5002

14 MAR 1990

REPLY TO ATTN OF: N/J5

SUBJECT: NORAD Statement of Requirement (NSOR) 01-90, ROCC/SOCC Computer Upgrade.

TO:

See Distribution

1. The subject NSOR is forwarded for your comment and coordination.

2. CINCNORAD requires a computer system at NORAD's Region/Sector Operations Control Centers with the capability to receive, process, integrate, display, store, and forward tell data collected from existing and future surveillance/intelligence systems in the Integrated Tactical Warning and Attack Assessment system. In addition, the computer system must provide timely lateral tell, integrate/relay data linked to and from airborne aircraft to ground battle management systems, facilitate real-time battle management, and support tactical decision makers with accurate real-time data and calculations for aircraft control/intercept operations.

3. Please provide responses and a point of contact (POC) by 15 Apr 90. HQ NORAD's POC is N/J5RS, Lt Col Johnson, AV 692-3399.

JAMES W. MCINTYRE
Brigadier General, USAF
Director, NORAD Planning Staff

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1. NSOR 01-90 (U)

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

STATEMENT OF OPERATIONAL REQUIREMENT (NSOR)

FOR

ROCC/SOCC

COMPUTER SYSTEM UPGRADE

NSOR 01-90

DRAFT 5 March 1990

HEADQUARTERS

NORTH AMERICAN AEROSPACE DEFENSE COMMAND

PETERSON AIR FORCE BASE, COLORADO 80914-5002

OPR: HQ NORAD/J5RS
LT COL JOHNSON, AV 692-3399

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NSOR 01-90

ROCC/SOCC COMPUTER SYSTEM UPGRADE

1. MISSION.

a. Mission area. The Region Operations Control Center/Sector Operations Control Center (ROCC/SOCC) computer system (AN/FYQ-93) is a major element used in the operational execution of three mission areas specified by the NORAD Agreement: 1) Surveillance and control of Canadian and the United States airspace (including counternarcotics operations), 2) Warning and assessment of aerospace attack, and 3) Response against air attack.

b. Mission Element Need. The ROCC/SOCC computer system is required to receive, process, integrate, display, store, and forward data collected from existing and programmed surveillance and intelligence systems via communication networks in the Integrated Tactical Warning and Attack Assessment (ITW&AA) system. In addition, the computer system must provide timely lateral and forward tell reporting; interface and display data linked to and from airborne surveillance and command and control aircraft for battle management; facilitate real-time battle management; and support tactical decision makers with accurate real-time data and calculations for aircraft control/intercept operations. The computer system must be able to accurately simulate peace-to-war exercise scenarios and air-to-air engagements for training.

2. BASIS OF NEED. The current ROCC/SOCC computer (AN/FYQ-93) systems used throughout NORAD for the integration and display of surveillance data use outmoded second generation technology (solid state, transistorized, and hardwired--not microchip components) and are rapidly reaching saturation. Upgrades to the AN/FYQ-93's memory and processing capability are no longer possible. Its present 512K memory and 19-bit address bus cannot be expanded further. New system integration requires preprocessing and even this workaround is quickly reaching its limits. After currently programmed sensor systems become operational and are interfaced with the AN/FYQ-93 system (1994), it will be at its maximum data processing capacity. New Wide Area Surveillance/Space Based Radar and integrated intelligence systems will exceed the AN/FYQ-93's processing capability.

a. Since the AN/FYQ-93 became operational in 1981, several additional new sensor systems have come on line and significantly increase data processing requirements: one Over-the-Horizon Backscatter (OTH-B) radar system (three more systems with seven fans are programmed), fifteen long range radars for the North Warning System (thirty-nine additional unattended radars are under construction), four Aerostat radar systems (up to thirteen

1-73 OTH-B
15-739 LRR NWS
4-713 Aerostat
7 coastal
10 Fo...'s

more expected to be deployed), interfacing with transportable tactical control/air defense radars, Airborne Warning and Control Systems (AWACS), and four to seven additional coastal radars. More than ten Relocatable OTH Radars (ROTHR) will also be added in the next few years.

b. In addition to new sensor systems, additional processing (integration) will be required for new automated Federal Aviation Administration (FAA) and Transport Canada flight plan processing and aircraft handovers, new peripheral command, control, and intelligence support systems interface, and the exchange of Federal intelligence/law enforcement information.

3. EXISTING CAPABILITIES.

a. The current ROCC/SOCC computer system and interconnecting communications network supports the NORAD missions as well as exercises (live and simulated) and training.

b. The AN/FYQ-93 processes (to include Real-Time-Quality-Control, RTQC) the data (search, beacon, and strobe) from existing radar sensors and displays this data (real-time) on ROCC/SOCC consoles for surveillance, intercept (if necessary), identification, and engagement (if necessary) within NORAD's area of responsibility. It also forward tells critical tactical warning, attack assessment, and suspected illegal drug traffic information to the CONUS ROCC and/or NCC. Information and tracks of interest are also lateral told between adjacent regions/sectors. The ROCC/SOCC computer system computes, processes, and displays intercept solutions for air-to-air intercepts (scramble data, guidance, winds aloft, etc.), flight data from FAA/Transport Canada (flight plans), airbase data (aircraft and runway status), weather data from outside agencies, track information (height, modes, tracking reliability, flight size, track number, fighter fuel states, etc.), exercise and training simulation, operations status messages (parity errors, circuit status, computer status), and battle management information (number and types of tracks in the system, number of kills, etc.).

4. PROGRAMMED CAPABILITIES: A number of hardware and software upgrades for the AN/FYQ-93 are in various stages of completion. The central computer's memory was increased to its maximum possible (from 256K to 512K), the mass memory disk increased (from 4.8 to 9.6 megabytes), display controllers memory increased to their maximum (from 4K to 8K), and radar input capacity increased from 20 to 25 data ports. These upgrades are short term fixes to accommodate new sensors coming on line in the next three to five years. Even with these upgrades, a collection of additional preprocessors is necessary to interface with new systems like AWACS, OTH-B, mobile tactical radars, aerostats, and ROTHR to overcome AN/FYQ 93 limitations.

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5. ASSESSMENT. Programmed upgrades of the AN/FYQ-93 have increased its capability to its near maximum limit. Surveillance systems currently coming on line exceed its processing capability and require additional external preprocessors. Processing and throughput limitations have been reached in the Display Controller and Peripheral Process Controller "B" (PPC B). When the Central Computer tasks the Display Controller before it has completed its last task, that portion of the task not complete will not be accomplished, and critical data may not be displayed. Peripheral Process Controller "A" is also near processing and throughput limitations. The Central Computer is limited to a maximum of 512K static memory that includes only 128K of logical memory. This small memory forces programs to be stored on the PPC B's 9.6M byte disk which significantly limits processing due to the time required to upload to the central computer. Although data compression using multiple preprocessors or Interface Control Units is a work around for current new systems, it is only a matter of time before system processing capability, design limitations of the Operator Display Console, and facility physical constraints are exceeded. The present AN/FYQ-93 computer system used in the ROCCs/SOCCs is peaking at over 90 percent capacity and new systems will increase this to a critical point where system peaks will exceed 100 percent and cause system degradation.

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6. CONSTRAINTS. A replacement/upgrade for the existing AN/FYQ-93 computer system must include present capabilities and provide for an integrated solution to solve the continually changing connectivity, processing, and display requirements of the ROCCs/SOCCs.

* This is not much help!

a. Objectives. The replacement/upgrade computer system should be compatible with as much of the existing ROCC/SOCC equipment (communications links, etc.) as practical, and must maintain standardization and commonality. Existing facility limitations (e.g., volume, power, cooling, etc.) must also receive consideration during system development in order to reduce overall acquisition costs and minimize system life cycle costs. Given the evolving Soviet atmospheric threat, provisions for computer system growth (e.g., memory capacity, processing capability, port access, etc.) to accommodate anticipated NORAD air defense countermeasures must be established. Proposed hardware/software solutions must meet all existing logistics support requirements for 2000 Reliability and Maintainability goals. Alternative system architectures must support the ROCC/SOCC functional description as defined in the JSS System Specification (ESD-RS 968 H/D, 15 Dec 83).

(19) (15)

b. Threat. The physical threat to the ROCC/SOCC computer is the same as for other equipment at NORAD fixed ground facilities. A detailed threat definition may be found in the North American Atmospheric Warning Technical Design Architecture, Volume II: "Threat, " Chapter 5 (SIO, 1 Dec 86).

Info

c. Intelligence and Mapping, Charting, and Geodesy (MC&G). Given the wide areas surveilled by systems such as OTH-B, ROTHR, and SBR, considerable redefinition of existing ROCC/SOCC displays will be required. The replacement computer design must be flexible enough to accommodate dynamic display requirements and real-time operator interaction.

* Not much help either

7. SECURITY. Classified technologies satisfying this requirement should be NORAD releasable.

8. PROPOSED FINANCIAL AND EVENT PLAN. Costs and responsibilities are not addressed in this NSOR and should be the subject of future U.S. and Canadian negotiations.

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